

Electric pipette**Field of the invention**

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The invention relates to an electric pipette. More specifically, the invention relates to improved ergonomics of an electric pipette:

10 **State of the art**

Pipettes are used for dosing various liquids from one vessel to another. The liquid is absorbed through an opening in the tip part of the pipette into the pipette by means of a cylindrical piston by driving the piston upwardly so that the tip container of the
15 pipette is filled. Accordingly, by driving the piston downwardly, the tip container will be emptied. The pipette (piston) can be manually or electrically operated. A laboratory worker frequently performs dosing operations repeatedly in succession, which may result in strain injuries in his/her hand. This imposes stringent requirements on the manipulation ergonomics of the pipette. There have been
20 efforts to improve the ergonomics of pipettes by means of the design of the handle, among other things.

A number of references disclose such solutions aiming at resolving problems related to ergonomics by means of the design. In addition to these references, WO
25 02/00346 A2 discloses a hand-held pipette of pistol model comprising a rotating hook for improved ergonomics. In the pipette of this reference, the hook is supported on the area between the user's thumb and index while the tip of the pipette points in the opposite direction. The pipette is of pistol model, which does not comprise any actual hook supporting the pipette on the index from the opposite
30 direction viewed from the user's direction. By shifting the position of the hook, the user may shift the point of support of the pipette in the area between his/her thumb and index as he/she wishes.

Conventional prior art electric pipettes comprise a hook part intended to provide
35 enhanced support of the pipette on the user's hand during the use of the pipette. The hook is normally supported on the index or the middle finger, directing forwardly viewed from the user's direction. In addition to the hook part, an electric pipette

comprises a display part for monitoring the dosage of liquid quantities, among other things, and a push-button part for driving the cylindrical piston into the desired direction.

5 Characteristics of the invention

The purpose of this invention is to further improve the comfort of use of electric pipettes and to thus prevent any strain injuries caused by their use.

10 To achieve this, the electric pipette of the invention is characterised by the electric pipette comprising a rotating hook part, a push-button part, a display part, or any combination of the rotating components mentioned above. The hook part is supported either on the user's index or middle finger, pointing substantially
15 during use. Since the hook part is rotatable, it can be fitted in the most comfortable position on the finger from the user's point of view, resulting in enhanced comfort of use. The push-button is used for driving the cylindrical piston by means of an electric motor and for absorbing liquid into the tip container of the pipette or for discharging liquid from the tip container. The rotation feature of the push-button
20 part allows positioning of the push-button at the ergonomically optimal location in the pipette. The display part simultaneously allows monitoring of the liquid amount in the tip container. The rotation feature of the display part allows the display to be continually visible during use without requiring the pipette to be turned in the user's hand.

25 The pipette of the invention allows appreciable improvements in the ergonomics of pipettes and reduction of strain injuries, and also adaptation of the same electric pipette to the preferences of several users.

30 The preferred embodiment of the invention is characterised by the features defined in the dependent claims below.

Drawings

35 The invention is explained in greater detail below by means of an example and with reference to the accompanying drawings, in which

Figure 1 shows an electric pipette of the invention viewed straight from the side,
Figure 2 shows the electric pipette of figure 1 viewed straight from the front,
Figures 3a-3c show partial lateral views of an electric pipette, with the positions of
the hook, push button and display of the electric pipette shifted alternately, and
5 Figure 4 shows the case of figure 3a viewed from below.

More specific description of the pipettes illustrated in the drawings

Figure 1 is a lateral view of the electric pipette 1. The electric pipette 1 consists of a
10 body 2 having a vertical axis 3, a tip part 4, a hook part 5, a push-button part 6 and a
display part 7. During use, the push-button part 6 is operated by the user's index
and the hook part is supported on his/her middle finger. The hook part 5 has the
purpose of stabilising and supporting the electric pipette 1 during use. This is of
paramount importance in the case of a multi-channel pipette, which is heavier to
15 manipulate. By pushing the push button 6, the user actuates the cylindrical piston by
means of an electric motor and controls the liquid amount in the tip container, the
same liquid amount being simultaneously monitored on the display part 7.

Figure 2 shows the electric pipette 1 of figure 1 viewed straight from the front. The
20 expression "straight from the front" means the direction to which the hook part 5
and the push-button part 6 point in a conventional electric pipette, in which parts 5,
6 and 7 form a stationary unit together with the body 2.

Figure 3a shows a partial lateral view of an electric pipette 1 viewed straight from
25 the front, with the position of the hook part 5 rotated around the vertical axis 3. The
push-button part 6 and the display part 7 remain in position. Rotation of the hook
part 5 about the vertical axis of the electric pipette 1 is allowed by the annular shape
of the hook part and by slide surfaces provided on both the hook part and the pipette
body 2, rotation of the hook part being possible owing to these features.

30 Figure 3b corresponding to figure 3a shows how the push-button part 6 is shifted
about the vertical axis 3, while the hook part 5 and the display part 7 remain in
position. In this case, the push-button part 6 has been shifted in the opposite
direction relative to the direction of the hook part 5 in the preceding example. This
35 will form a negative angle. Rotation of the push-button part 6 about the vertical axis
3 has been provided on the same principle as rotation of the hook part. Moreover, an
electric contact surface has been provided on the slide surfaces in order to allow

powering of the electric motor driving the piston in any position of the push-button part.

Corresponding to figures 3a and 3b, figure 3c shows how the display part 7 is shifted about the vertical axis 3 while the hook part 5 and the push-button part 7 remain stationary. Rotation of the display part 7 and operation of the electrically driven display in different positions of the display part have been provided in the same manner as in the case of the push-button part 6 above.

Figure 4 shows, viewed from below, how the hook part 5 of the electric pipette 1 has been shifted as in figure 3a by an angle φ_1 so as to deviate from a position directed straight forwardly. The display part 7 and the push-button part 6 point straight forwardly. Similarly, the hook part 5 can be deviated into the other direction as well. The push button part 6 can be accordingly deviated over an angle φ_2 and the display part 7 over an angle φ_3 . These parts 6 and 7 can also be deviated into the opposite direction. Rotation of these three parts 5, 6 and 7 allows adaptation of the electric pipette 1 to both left-handers and right-handers. In addition, they serve to influence the balance of the electric pipette 1, a crucial feature in the case of heavy multi-channel pipettes.

All of the rotatable parts 5, 6 and 7 can be disposed so as to be 360 ° rotatable, i.e. into any position relative to the pipette body 2. For convenient use, the angles $\varphi_1 - \varphi_3$ can be restricted to the range $-90 - 90$ °, preferably $-70 - 70$ °, and very advantageously to the range $-50 - 50$ °. The electric pipette 1 can be carried out with only one of the three potential rotatable parts 5, 6 and 7 rotatable about the vertical axis 3. It can also be carried out with two of the three potential parts or all three parts 5, 6 and 7 rotatable about the vertical axis 3.

Figure 5 illustrates how the axis of rotation 8 of the display part 7 has been deviated from the vertical axis 3 of the pipette, so that rotation of the display part allows simultaneous adjustment of the inclination of the display part according to the user's preferences. The angle α between the axis of rotation 3 and the vertical axis 8 is in the range $0 - 60$ °, preferably $0-50$ ° and very advantageously $0 - 40$ °.

The drawings above illustrate but a number of preferred embodiments and do not by any means restrict the invention. The preferred embodiments of the invention may vary freely within the scope of protection defined by the accompanying claims.